

# Protection from Chemical and Biological Threats



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# Agenda

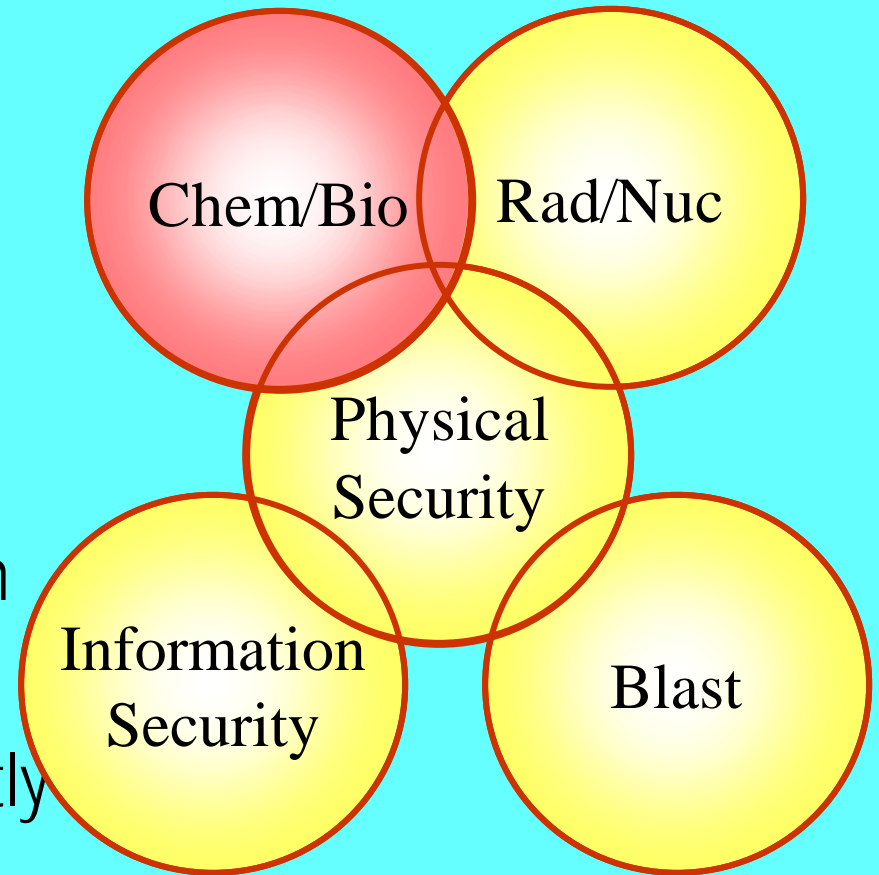
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- Chemical Biological Protection Overview
- CBR Agents and Their Release Methods
- Protection Assessment
- Applications
- Summary & Questions

# CB Protection Overview

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- Threats to infrastructure are constantly evolving
- Chemical and biological (CB) protection is becoming a key element of protection
- Protective measures may be applicable to multiple protection elements
- CB requirements are significantly different than those for conventional weapons

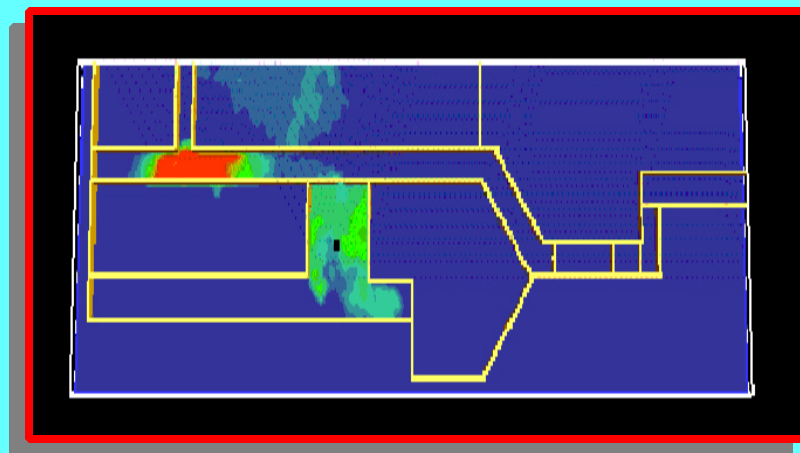


# CB Protection Overview

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## *Why are buildings vulnerable to CB attack?*

- Containment of CB agents within a confined space allows concentrations to rapidly reach and sustain lethal levels
- CB agents are effectively transported throughout a building by mechanical systems
- Population densities are high in buildings or vehicles
- Potential to deliver agent covertly
- Numerous adsorbing surfaces that make building restoration difficult



# CBR Agents and Their Release Methods

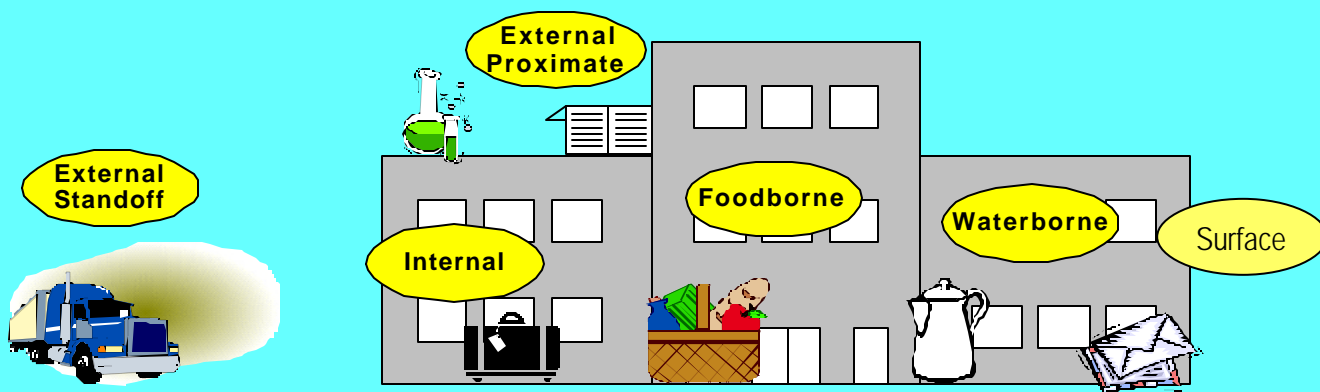
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## ■ CB Agents

- Chemical Agents (sarin, VX, mustard, etc)
- Biological Agents (anthrax, plague, cholera, etc)
- Toxic Industrial Chemicals ( ammonia, formaldehyde, etc)

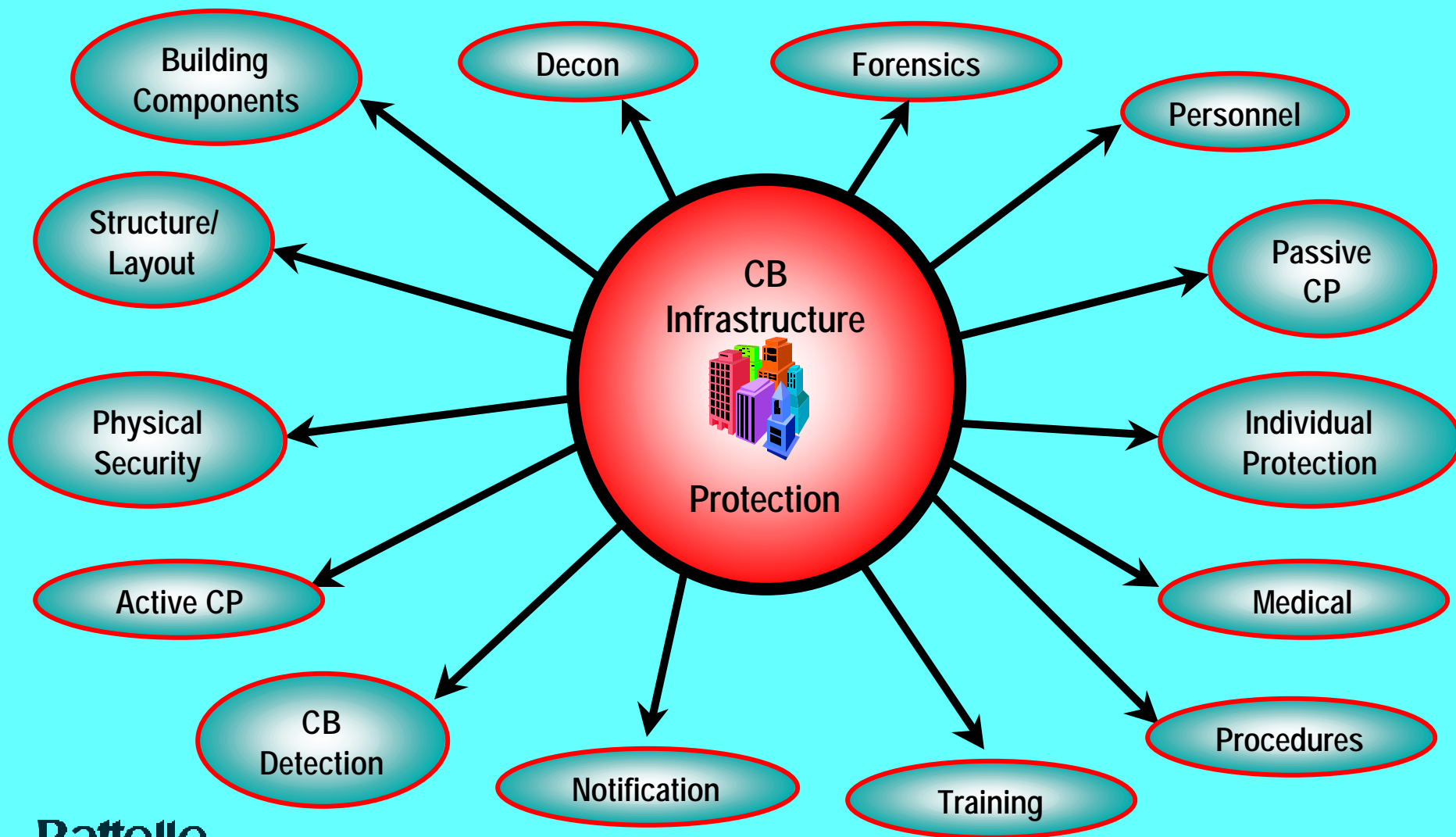
## ■ Release Types

- Airborne - external standoff, external proximate, internal
- Surface
- Foodborne
- Waterborne



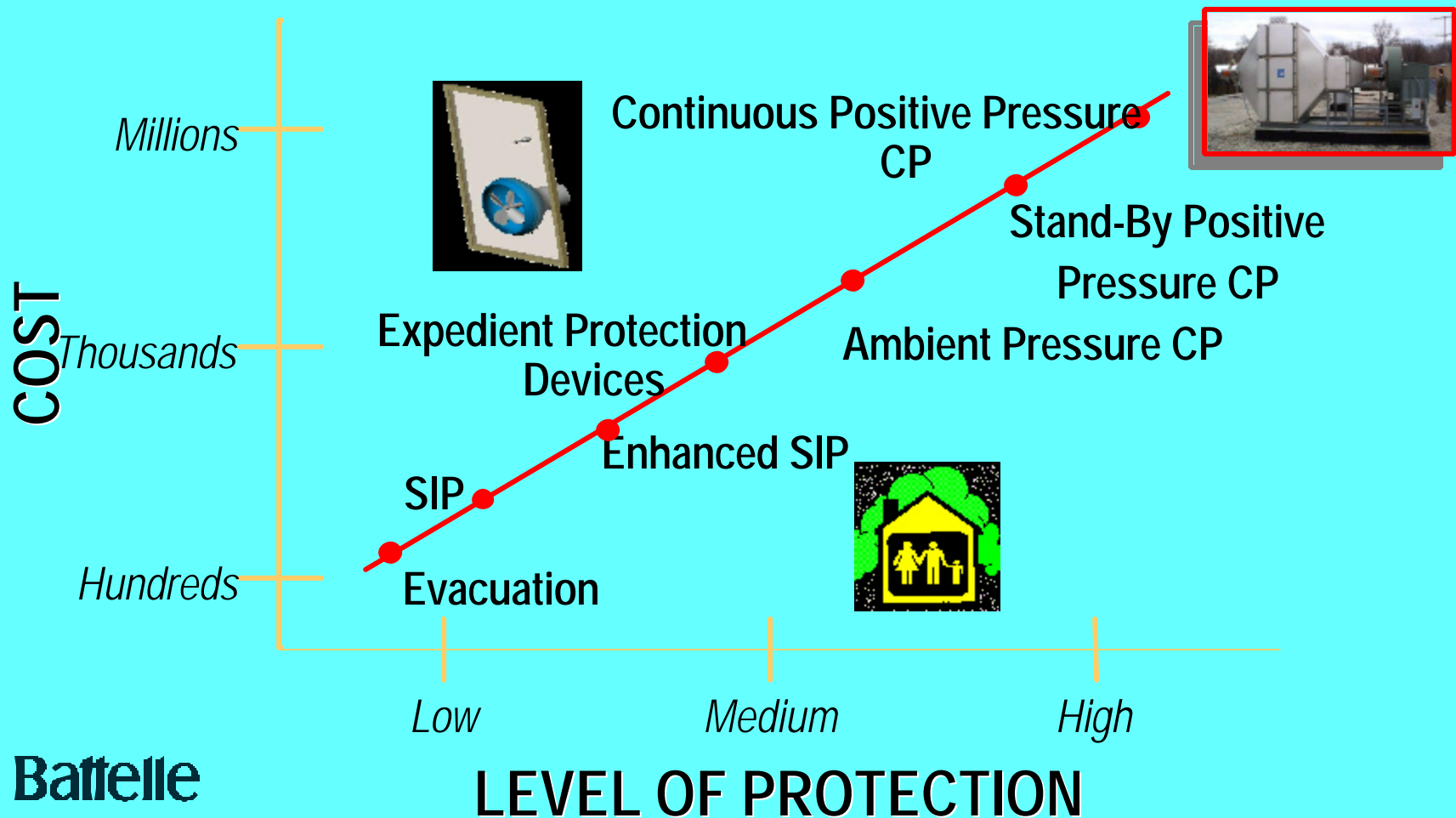
# CB Protection Program (Continued)

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# CB Protection Options

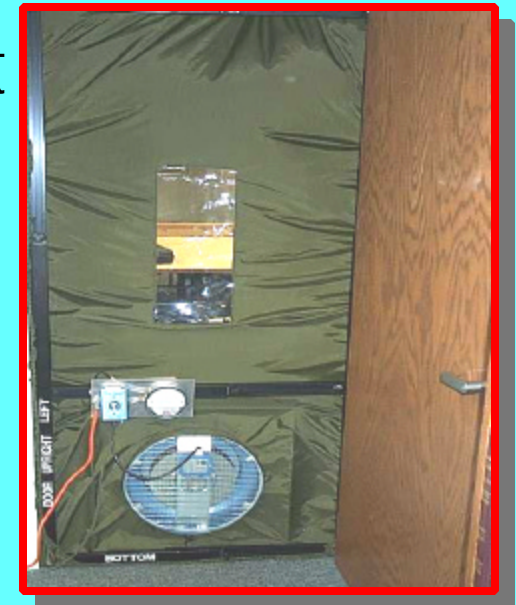
## Technology Cost vs. Level of Protection



# *Expedient Collective Protection*

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- Use of an expedient fan filter assembly to protect selected region of a building
- Independent of building HVAC system
- ECP provides filtered air and pressurization to the protective envelope similar to that of an Integrated Positive Pressure CP system
- Protection provided by ECP is dependent
  - Filter efficiency
  - Protective envelope leakage rate
  - Location of assembly
- Requirements for effective ECP
  - advanced warning of hazard
  - effective sealing of envelope
  - centralized control of HVAC system





# *Ambient Pressure Collective Protection*

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- Use of low efficiency gas/particulate filters within existing AHUs to continuously remove CB agents released externally and internally
- Goal is to decrease the dependency on an early warning system by providing continual low level protection at a low cost
- APCP provides protection prior to taking actions to seal the building.
- Protection provided by APCP is dependent upon:
  - Filter efficiency
  - Air exchange rate of HVAC system
  - Air exchange rate with the exterior through building leakage
  - Threat concentration
- Requirements for effective APCP
  - effective sealing of envelope
  - centralized control of HVAC system



# *Integrated Positive Pressure Collective Protection*

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- Use of high efficiency gas/particulate filters integrated with the existing HVAC system to remove CB agents released externally
- IPPCP may be designed to operate continuously or in the standby mode. Continuous systems are operationally obtrusive and standby systems require early warning
- Goal is to prevent infiltration of external contaminants by positively pressurizing the entire building utilizing clean air. Filters provide a removal efficiency in excess of 99.999%.
- Protection provided by IPPCP is dependent upon:
  - Advanced warning (standby)
  - Overpressure level achieved
- Requirements for effective SBIPPCP
  - advanced warning of hazard (standby)
  - effective sealing of envelope
  - centralized control of HVAC system



# CB Protection Applications

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## Chemical Stockpile Emergency Preparedness Program (CSEPP)

- Conducted CB protection assessments for buildings adjacent to the seven U.S. chemical agent stockpile sites
- Assisting local subcontractors with the design, selection, and



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## DTRA Smart Building



- Developed and implemented an extensive CBR protection system for the FBI Operations Center in the continental U.S.
- Objective was to design a transportable protection system that can be utilized at other locations

# CB Protection Applications (Continued)

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## UMMC/Shock Trauma



- Conducted a threat, vulnerability and protection assessment of the new UMMC emergency care and shock trauma facility
- Recommendations for providing protection to medical personnel and for implementing mass casualty decon were implemented into the facility design

## Project Tie Down - Pentagon



- Developing an integrated NBC protection and early warning system for the Pentagon reservation
- Effort includes a protection assessment, design, cost/benefit analysis, and installation



# CB Protection Applications (Continued)

## DARPA Immune Building

- Identifying solutions for protecting, restoring, and collecting forensic evidence in the event of a CB incident against a military building
- Conducting full-scale feasibility experimentation in a 30,000 sq ft barracks building



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## CB Protection of Military Vehicles



- Worked with DoD to develop and integrate advanced collective protection technologies into military vehicles (tanks, assault vehicles)

# Summary

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- Prominent buildings are vulnerable targets and will only provide negligible protection to occupants
- CB protection systems are currently being applied to a number of key buildings
- A variety of CB protection options exist ranging from low cost / low PF methods to high cost/high PF methods
- Research is ongoing to characterize the problem and to provide more cost effective solutions



# Contact Information

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- For further information regarding CB Building Protection or Battelle, please contact:

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